November 19, 2002 G9704-SSG-012

DOCUMENT CONTROL DESK UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D.C. 20555

Ø\_ BOEING Reference:

- a) Boeing Letter G-1151-RSO-92-365 dated August 31, 1992; R.S.
  - Orr to the NRC Operations Center
- b) NRC Letter Docket No. 99901227 dated August 12, 1992; L. J. Norrholm to R. S. Orr; Subject: Response to 10 CFR 21 Inquiry

#### Dear Sir or Madam:

In accordance with the Reference correspondence and 10 CFR 21, Boeing is sending the NRC the attached error notices received from our former software suppliers. Because of unknown current addresses, the following former customers were not notified:

Reactor Controls, Inc
Echo Energy Consultants
Nuclear Applications and Systems Analysis Company (Japan)
Nuclear Power Services
GPU Nuclear Corporation
Tenera, Inc.
Stone & Webster Engineering

Error notices have been sent to our other former customers.

Very truly yours,

Mark S. Snyder

Nuclear Administrator

Mail Code 7A-43

Enclosures: GT STRUDL Program Report Forms 2002.03 through 2002.05

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FROM:		ATE: 7/24/02
FROM:	Computer-Aided Structural Engineering Center Georgia Institute of Technology Atlanta, Georgia 30332-0355	
SEVERITY I	LEVEL:	
X URGENT	Problem results in incorrect answers which may not be apparent or job be recovered within the session or job.	ob aborts and cannot
_ SERIOUS	Problem results in incorrect answers which are obvious o completion of a particular user's task.	r problem prevents
_MINOR	Problem can be worked around or problem poses high fru	stration factor.
	TIVE Documentation error, program usage tip, user inconvenier	nces.
Date Problem	Confirmed 7/24/02 ion Sent 7/24/02	
Date Notificat	ion Sent7 /24/02	
Computers Operating Syst	All tem _ All	
Versions All	versions prior to and including Version 26	
Target Release	e for Correction Version 27	
Signature R & D Division	Director ASD Title	
Kenneth Will Typed or Printe	ed Name Date of Signature	
Signature Professional Se	Contigues tun Control Manage  Title  Ervices Division	
Typed or Printe	Key	
Typed of Printe	ed Name Date of Signature	Rev 23

GPRF No.: 2002.03

# GTSTRUDL Program Report Form (Continued)

GPRF No.: WOL. U3

DATE: 7/24/02

### **DESCRIPTION:**

STIFFNESS ANALYSIS will abort if MEMBER RELEASES and a MEMBER TEMPERATURE LOAD have been specified for a plane or space truss member.

Workaround: Remove the Member Releases for the truss members.

Example:

TYPE SPACE TRUSS MEMBER INCIDENCES 27 10 20

••••

MEMBER RELEASES
27 START MOM X Y Z END MOM Y Z

LOADING 1 MEMBER TEMPERATURE LOAD 27 AXIAL 100.

Applicable Sections of the Documentation:

MEMBER RELEASES

Section 2.1.8.2 of Volume 1 of the GTSTRUDL Reference

Manual

MEMBER TEMPERATURE LOAD Section 2.1.11.4.4 of Volume 1 of the GTSTRUDL Reference

Manual

STIFFNESS ANALYSIS

Section 2.1.13.2 of Volume 1 of the GTSTRUDL Reference

Manual

1 11,

GPRF No.: 2002 04

DATE: <u>9/13/2002</u>

FROM:	Computer-Aided Structural Engineering Center Georgia Institute of Technology Atlanta, Georgia 30332-0355		
SEVERITY I	LEVEL:		
X URGENT		incorrect answers which may not be apparent or job e recovered within the session or job.	
_ SERIOUS		Problem results in incorrect answers which are obvious or problem prevents completion of a particular user's task.	
_MINOR	Problem can be wor	rked around or problem poses high frustration factor.	
_ INFORMA	TIVE Documentation erro	or, program usage tip, user inconveniences.	
Date Problem	Confirmed <u>September 1</u>	3, 2002	
Date Notifica	tion Sent		
ComputersA	All		
Operating Sys	stem_All		
Version All			
	e for Correction Version		
Munulla Signature R & D Divisio	Stanger on	Sr. RE Title	
Michael H. S Typed or Prin	<del>-</del>	9/13/2002  Date of Signature	
Signature Professional S	Services Division	Configuration Contol Manager Title	
David C Typed or Prin	ley ted Name	Date of Signature	

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(Continued)

- 5

GPRF No.: 2002.04

DATE: <u>9/13/2002</u>

#### **DESCRIPTION**:

The second and later in a sequence of DYNAMIC ANALYSIS EIGENVALUE, ASSEMBLE FOR DYNAMICS, and DYNAMIC ANALYSIS MODE SUPERPOSITION commands will not reassemble the composite modal damping matrix if the only source of damping is joint damping proportionional to joint inertia. The following sequence of commands illustrates this situation:

```
INERTIA OF JOINTS WEIGHT
                                                 1209660318 DAMPING
  1 TRANS X 75917.46 Y 75917.46 ROTATION Z
  2 TRANS X 77064.00 Y 77064.00 ROTATION Z 1287174145 DAMPING
                                                                     0.04
  3 TRANS X 54917.00 Y 54917.00 ROTATION Z
                                                 855341667 DAMPING
                                                                     0.04
  4 TRANS X 40988.51 Y 40988.51 ROTATION Z
                                                  586281275 DAMPING
                                                                      0.04
                                                  716459995 DAMPING
     TRANS X 50329.18 Y 50329.18 ROTATION Z
                                                                      0.04
                                                 148471761 DAMPING
  6 TRANS X 21339.21 Y 21339.21 ROTATION Z
EIGEN PARAMETERS
SOLVE USING GTLANCZOS
NUMBER OF MODES 18
PRINT MAX
END
$$* **
$$* ** First DYNAMIC ANALYSIS EIGENVALUE command causing the first composite
$$* ** modal damping matrix assembly.
$$* **
DYNAMIC ANALYSIS EIGENVALUE
CHANGE
INERTIA OF JOINTS WEIGHT
      DAMPING 0.09
  1
               0.09
  2
       DAMPING
       DAMPING 0.09
  3
               0.09
  4
      DAMPING
  5
       DAMPING
                0.09
       DAMPING
  6
               0.09
ADD
$$* **
$$* ** Second DYNAMIC ANALYSIS EIGENVALUE command in which the composite modal
$$* ** damping matrix is erroneously not re-assembled.
$$* **
DYNAMIC ANALYSIS EIGENVALUE
```

The only work-around is to break up the problem into separate jobs, where each job

reflects the different composite modal damping data.

### GTSTRUDL User Reference Manual Sections:

Specification of Damping Properties

Section 2..4.3.4, Volume 3, Rev. M, GTSTRUDL Reference Manual

GPRF No.: <u>2002.05</u>

	3/12/3	**************************************	DATE: <u>9/18/2002</u>
FROM:	Computer-Aided Structura Georgia Institute of Techno Atlanta, Georgia 30332-03	ology	
SEVERITY L	EVEL:		
X URGENT		incorrect answers which e recovered within the s	h may not be apparent or job session or job.
_ SERIOUS		incorrect answers who of a particular user's ta	nich are obvious or problem ask.
_ MINOR	Problem can be wor	ked around or problem	poses high frustration factor.
_ INFORMA	TIVE Documentation erro	or, program usage tip, us	ser inconveniences.
	Confirmed September 1		<del></del>
Date Notificat	$100 \text{ Sent} \qquad 9/18/200$	2	
Computers A	A11		
Operating Sys	tem_All		<del></del>
Version <u>All</u>			<del></del>
Target Release	e for Correction Version 2	27.0	
Milall	Some	Sr. RE	
Signature R & D Division	on	Title	
Michael H. S	Swanger	9/18/02 Date of Signature	
Signature	14	Configuration Con	trol Manager
Professional S	ervices Division	, ,	
1) kind C. Typed or Print	ted Name	9/18/02 Date of Signature	<del></del>

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GPRF No.: 2002.05

DATE: 9/18/2002

#### **DESCRIPTION:**

The CREATE RESPONSE SPECTRUM command will abort if the total number of time points needed to perform the integration for a specified acceleration time history file applied to a specified frequency exceeds 1 million, which is the maximum number of allowable time points. The following CREATE RESPONSE SPECTRUM example illustrates such a case:

#### UNITS CYCLES SECONDS

CREATE RESPONSE SPECTRUM ACCELERATION LINEAR VS FREQUENCY LINEAR FILE 'LIN-004X'

```
FREQUENCY RANGE FROM 0.1 TO 3.0 AT 0.1 -
FROM 3.0 TO 3.6 AT 0.15 -
FROM 3.6 TO 5.0 AT 0.2 -
FROM 5.0 TO 8.0 AT 0.25 -
FROM 8.0 TO 15.0 AT 0.5 -
FROM 15.0 TO 18.0 AT 1.0 -
FROM 18.0 TO 22.0 AT 2.0 -
FROM 22.0 TO 55.0 AT 3.0
DAMPING PERCENTS 1.0 2.0 4.0
INCLUDE STRUCTURAL NATURAL FREQUENCIES
USE ACCELERATION TIME HISTORY FILES 'THO-04X'
INTEGRATE USING WILSON
DIVISOR 1000.0
END OF CREATE RESPONSE SPECTRUM
```

The integration time increment for each of the frequency points in the specified frequency range is computed as 1/(f\*DIVISOR), where f is the natural frequency (Hz) under consideration. For example, if the frequency f = 43 Hz, then for DIVISOR = 1000, the integration time increment is 1/43000 = 2.3255e-5 seconds. If there are 26 seconds in the specified acceleration time history file THO-04X, the total number of time points needed for the integration calculation is 26/2.3255e-5+1=1.118 million > 1 million. The easiest work-around is to use a smaller DIVISOR value. In this and most cases, DIVISOR = 1000 is far in excess of what is reasonable to produce accurate and consistent results. Note that the default value for DIVISOR is 12.0; therefore in the large majority of cases it should not be necessary to exceed 100.0 for the DIVISOR value.

### GTSTRUDL User Reference Manual Sections:

The CREATE RESPONSE SPECTRA Command

Section 2..4.8.2, Volume 3, Rev. R, GTSTRUDL Reference Manual

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GPRF No.: 2002.03

DATE: 7/24/02

	Georgia Institute of Technol Atlanta, Georgia 30332-035	logy
SEVERITY LE	EVEL:	
X URGENT	Problem results in incorrect ar be recovered within the sessi	nswers which may not be apparent or job aborts and canno ion or job.
_ SERIOUS	Problem results in incompletion of a parti-	correct answers which are obvious or problem prevents cular user's task.
_MINOR	Problem can be work	ed around or problem poses high frustration factor.
		, program usage tip, user inconveniences.
Date Problem C	Confirmed 7/24/02	<u> </u>
Date Notification	on Sent 7/24/02	
Computers Operating Syste	All em <u>All</u>	
Versions All v	versions prior to and includir	ng Version 26
	for Correction <u>Version 2</u>	7
Signature R & D Division	Jella 11	Director ASD Title
Kenneth Will Typed or Printed	d Name	7/24/0 Z  Date of Signature
Signature Professional Ser	vices Division	Contiguation Control Manage ~ . Title
Typed or Printed	Name	Date of Signature
- Juca of Filmico	* I will	Date of Signature  Rev. 2.3

# GTSTRUDL Program Report Form (Continued)

GPRF No.: WOL. UZ

DATE: 7/24/2-2

### **DESCRIPTION:**

STIFFNESS ANALYSIS will abort if MEMBER RELEASES and a MEMBER TEMPERATURE LOAD have been specified for a plane or space truss member.

Workaround: Remove the Member Releases for the truss members.

Example:

TYPE SPACE TRUSS MEMBER INCIDENCES 27 10 20

MEMBER RELEASES
27 START MOM X Y Z END MOM Y Z

LOADING 1 MEMBER TEMPERATURE LOAD 27 AXIAL 100.

Applicable Sections of the Documentation:

MEMBER RELEASES

Section 2.1.8.2 of Volume 1 of the GTSTRUDL Reference

Manual

MEMBER TEMPERATURE LOAD Section 2.1.11.4.4 of Volume 1 of the GTSTRUDL Reference

Manual

STIFFNESS ANALYSIS

Section 2.1.13.2 of Volume 1 of the GTSTRUDL Reference

Manual

GPRF No.: 2002 04

	· † - i	14, }
		DATE: <u>9/13/2002</u>
FROM:	Computer-Aided Structura Georgia Institute of Techn Atlanta, Georgia 30332-03	ology
SEVERITY I	LEVEL:	
X URGENT		incorrect answers which may not be apparent or job se recovered within the session or job.
_ SERIOUS		n incorrect answers which are obvious or problem n of a particular user's task.
_MINOR	Problem can be wo	rked around or problem poses high frustration factor.
_ INFORMA	TIVE Documentation error	or, program usage tip, user inconveniences.
Date Problem	Confirmed September 1	3, 2002
Date Notifica	tion Sent	
Computers	Ali	
Operating Sys	stem_All	· <del></del>
Version <u>All</u>		
Target Releas	e for Correction Version	26.0
Munulla Signature R & D Divisio	Stanger on	Sr. RE Title
<u>Michael H. S</u> Typed or Prin	Swanger	9/13/2002 Date of Signature
Signature Professional S	Services Division	Configuration Contol Manager Title
David C Typed or Prin	. Key tcd Name	Date of Signature

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14

GPRF No.: 2002.04

DATE: <u>9/13/2002</u>

#### **DESCRIPTION:**

The second and later in a sequence of DYNAMIC ANALYSIS EIGENVALUE, ASSEMBLE FOR DYNAMICS, and DYNAMIC ANALYSIS MODE SUPERPOSITION commands will not reassemble the composite modal damping matrix if the only source of damping is joint damping proportionional to joint inertia. The following sequence of commands illustrates this situation:

```
INERTIA OF JOINTS WEIGHT
  1 TRANS X 75917.46 Y 75917.46 ROTATION Z 1209660318 DAMPING
  2 TRANS X 77064.00 Y 77064.00 ROTATION Z 1287174145 DAMPING 0.04
  3 TRANS X 54917.00 Y 54917.00 ROTATION Z
                                                855341667 DAMPING 0.04
  4 TRANS X 40988.51 Y 40988.51 ROTATION Z
                                                 586281275 DAMPING 0.04
  5 TRANS X 50329.18 Y 50329.18 ROTATION Z
                                                 716459995 DAMPING
                                                                    0.04
  6 TRANS X 21339.21 Y 21339.21 ROTATION Z 148471761 DAMPING 0.04
EIGEN PARAMETERS
SOLVE USING GTLANCZOS
NUMBER OF MODES 18
PRINT MAX
END
$$* **
$$* ** First DYNAMIC ANALYSIS EIGENVALUE command causing the first composite
$$* ** modal damping matrix assembly.
$$* **
DYNAMIC ANALYSIS EIGENVALUE
CHANGE
INERTIA OF JOINTS WEIGHT
  1 DAMPING 0.09
      DAMPING 0.09
  3
      DAMPING 0.09
      DAMPING 0.09
      DAMPING - 0.09
  6
       DAMPING
                0.09
ADD
$$* ** Second DYNAMIC ANALYSIS EIGENVALUE command in which the composite modal
$$* ** damping matrix is erroneously not re-assembled.
$$* **
DYNAMIC ANALYSIS EIGENVALUE
```

The only work-around is to break up the problem into separate jobs, where each job

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### GTSTRUDL User Reference Manual Sections:

Specification of Damping Properties

Section 2..4.3.4, Volume 3, Rev. M, GTSTRUDL Reference Manual

GPRF No.: 2002.05

DATE: <u>9/18/2002</u>

FROM:	Computer-Aided Structur Georgia Institute of Techn Atlanta, Georgia 30332-0	nology
SEVERITY I	.EVEL:	
X URGENT		incorrect answers which may not be apparent or job be recovered within the session or job.
_ SERIOUS		n incorrect answers which are obvious or problem on of a particular user's task.
_ MINOR	Problem can be wo	orked around or problem poses high frustration factor.
_ INFORMA	TIVE Documentation err	or, program usage tip, user inconveniences.
Date Problem	Confirmed September	18, 2002
Date Notificat	tion Sent 9/18/200	2
Computers _A	M	
Operating Sys	tem_All	
Target Release	e for Correction Version	27.0
Millach	Stages	Sr. RE
Signature	V	Title
R & D Divisio	on	, ,
Michael H. S		Date of Signature
Typed or Print	ed Name	Date of Signature
Signature	14	Configuratio-Control Manager Title
_	ervices Division	
David C. Typed or Print	llez	9/18/02
Typed or Print	ed Name	Date of Signature

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GPRF No.: 2002.05

DATE: 9/18/2002

### **DESCRIPTION:**

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#### UNITS CYCLES SECONDS

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```
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FROM 3.0 TO 3.6 AT 0.15 -
FROM 3.6 TO 5.0 AT 0.2 -
FROM 5.0 TO 8.0 AT 0.25 -
FROM 8.0 TO 15.0 AT 0.5 -
FROM 15.0 TO 18.0 AT 1.0 -
FROM 18.0 TO 22.0 AT 2.0 -
FROM 22.0 TO 55.0 AT 3.0
DAMPING PERCENTS 1.0 2.0 4.0
INCLUDE STRUCTURAL NATURAL FREQUENCIES
USE ACCELERATION TIME HISTORY FILES 'THO-04X'
INTEGRATE USING WILSON
DIVISOR 1000.0
END OF CREATE RESPONSE SPECTRUM
```

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The integration time increment for each of the frequency points in the specified frequency range is computed as 1/(f\*DIVISOR), where f is the natural frequency (Hz) under consideration. For example, if the frequency f = 43 Hz, then for DIVISOR = 1000, the integration time increment is 1/43000 = 2.3255e-5 seconds. If there are 26 seconds in the specified acceleration time history file THO-04X, the total number of time points needed for the integration calculation is 26/2.3255e-5+1=1.118 million > 1 million. The easiest work-around is to use a smaller DIVISOR value. In this and most cases, DIVISOR = 1000 is far in excess of what is reasonable to produce accurate and consistent results. Note that the default value for DIVISOR is 12.0; therefore in the large majority of cases it should not be necessary to exceed 100.0 for the DIVISOR value.

### GTSTRUDL User Reference Manual Sections:

The CREATE RESPONSE SPECTRA Command

Section 2..4.8.2, Volume 3, Rev. R, GTSTRUDL Reference Manual